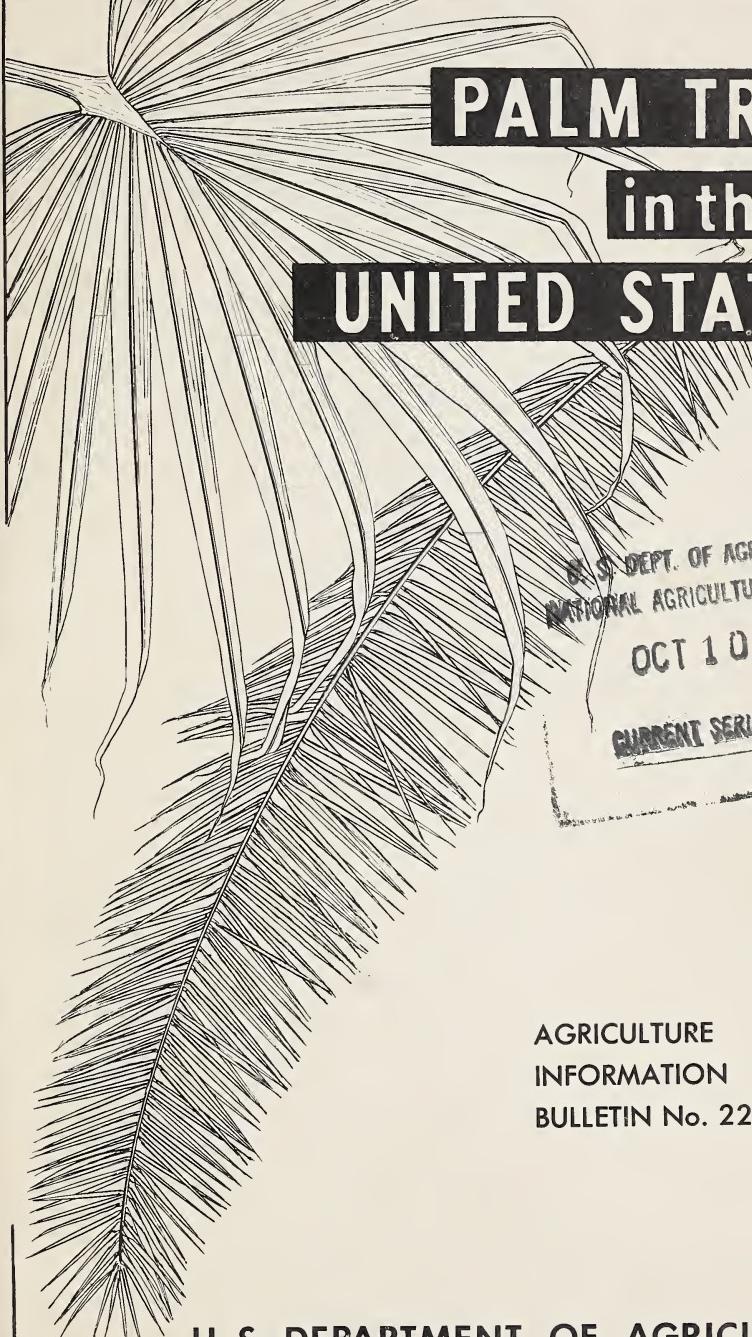


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PALM TREES in the UNITED STATES

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U. S. DEPARTMENT OF AGRICULTURE
Forest Service

PREFACE

PALMS form an integral part of the native woody vegetation of the United States, especially the Southeast, and yet are known well to few persons living outside the areas where they grow. Wherever they are native or are cultivated outdoors in our country, they lend an air of tropical luxuriance and usually indicate a mild climate.

Palm products from various parts of the world enter extensively into our modern economy. Most important are the oils from the fruits or seeds of palms such as coconut, African oilpalm, and babassu. Among their many other uses, these oils are employed in the manufacture of soap, edible products, cosmetics, tin cans, roofing plate, glycerine, and synthetic rubber. Wax from the leaves of carnauba is a basic ingredient of many kinds of polishes; it also plays a part in making carbon paper.

Rattan stems are used for fenders or buffers of boats, snow-brooms, ski stocks, and walking sticks, besides rattan, "cane," and "reed" furniture and caned chairs. Raffia is favored for tying plants in nursery work. Diverse commercial palm fibers include piassava for street brooms; coir for doormats, rugs, and cable coverings; buntal for fine hats; and palmetto for brushes. Buttons fashioned from the hard seeds of ivy palms must now compete with plastics.

Most of our native palms served the aboriginal Indians and early white travelers in various ways. Similar uses still persist locally and some species now furnish raw materials for manufactured articles. Leaves provide thatch and fans and are made into brushes, ropes, hats, mats, baskets, and other woven articles. Trunks are used for pilings, temporary construction, and as a source of tannin. They have been processed for wallboards, ropes, rugs, upholstery stuffing, and as a cork substitute. Flowers furnish honey; the edible bud or "cabbage" provides food and is sometimes used as a salad delicacy; the fruits serve in medicine and are eaten by humans as well as birds and animals. Livestock browse the leaves of low-growing species, especially in winter. Fortunately, too, the coconut and date, two of the most valuable food-yielding palms of the Old World, are now naturalized within our borders.

Interest in the importance of palms in the world economy, especially oil-yielding species native to the Western Hemisphere, is increasing. This bulletin fills a gap in popularly available published information on an interesting group of trees species native to the United States.

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III



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Figure 1.—Natural stand of cabbage palmettos in Florida.

Palm Trees in the United States

By MIRIAM L. BOMHARD,¹ *range conservationist, Forest Service*

Fourteen species of palms, belonging to nine genera, are native to the United States. Only one occurs in the West; the others are naturally distributed in the Southeastern and Southern States—from North Carolina through Florida and the Gulf Coast States into Texas and as far inland as Arkansas and southeastern Oklahoma. Some of them cover extensive areas (fig. 1). The greatest number of species occurs in Florida. The total of 14 is a relatively large representation since the southern tip of Florida is the only essentially tropical portion of our country. In addition, two Old World palms, the coconut and the date, have become naturalized; that is, in many areas where they have escaped from cultivation, the climate and soil have proved so suitable for their growth that they appear to be native.

Nine of our species are full-sized trees; three of the others are arborescent under certain conditions. The California washingtonia, cabbage palmetto, Texas palmetto, and Florida royalpalm are probably the best known of our native tree palms. The remaining five, including two kinds of thatchpalm, Florida silverpalm, paurotis, and Florida cherrypalm, are much less familiar, occurring in southern Florida or the Florida Keys. But two species—the widely distributed dwarf palmetto and the needlepalm of restricted range—are not treelike.

USEFULNESS OF THE PALM FAMILY

Next to grasses the palm family is the most important in the plant kingdom from the standpoint of its usefulness to man. Countless people in the more primitive warmer areas of the world depend upon palms for many of their everyday requirements and some luxuries as well. The coconut is undoubtedly the most useful of all palms, but a dozen or more others seem to be ready-made to serve almost every domestic purpose.

In every region where palms grow, certain species are sought out for their special characteristics. One kind may be valued for

¹ Dr. Bomhard died Dec. 16, 1952.

its stronger, denser wood; another, for its more durable leaves; still others for finer or stronger fibers, the sugar content of the sap, the starch stored in the trunk, edible fruits, oil in the kernels of the seeds or fruit flesh, refreshing drinks, or for other characteristics. Although most of these utilizations are of little importance to modern man, the whole world depends upon the palm family for an abundant supply of certain needed vegetable oils and waxes. During World War II, nations including our own made strenuous efforts to secure lesser known palm oils or other substitutes when sources of copra and coconut oil and African oilpalm kernel and palm oils were cut off. A number of other palm products or materials play a distinctive role in our civilized economy.

NUMBER AND DISTRIBUTION

The exact number of the world's palm species is not known, but there are probably about 4,000; at least 1,250 kinds grow in the Western Hemisphere. Brazil and Colombia have the greatest number of species; the next largest representation is in Malaya, India, and Ceylon. Although the palm family is chiefly tropical, many species are native to subtropical and warm temperate regions, extending as far south as New Zealand and Chile and as far north as southern Japan, Afghanistan, southern Europe, North Carolina, and southern California.

The great majority are at home in low-lying areas, but some occur in mountains. Those which thrive at very high elevations, up to 14,000 feet above sea level, are exceptional in the family. Most palms can be grown beyond the natural limits of their distribution, and many kinds have been planted for ornamental purposes. Under suitable conditions some commercially important palms are successfully cultivated in areas far from those where they originated.

GENERAL CHARACTERISTICS

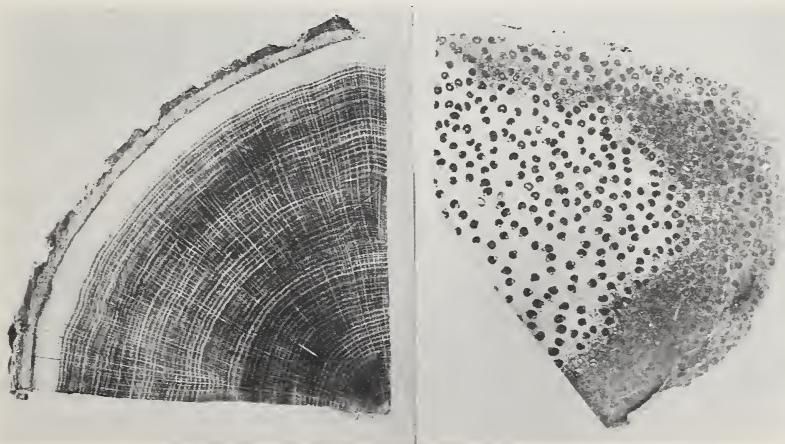
Palms are woody plants of varied habit. Many of them are tall trees with a beautifully proportioned, symmetrical, unbranched trunk, crowned by a tuft of handsome featherlike or fan-shaped leaves. Palms 50 or 60 feet high are considered tall, but some attain 100 feet or even more. The tallest palms known (*Ceroxylon*) of the Colombian Andes may grow to 200 feet. The smallest palms (*Malortiea*) may be less than 2 feet high. The trunk diameter of slender trees is often only a few inches; the more robust ones are 1 to 3 feet and occasionally even wider. Branching seldom occurs, unless due to injury, but a few kinds, notably *Hyphaene*, naturally

have a branched or forking trunk. Palm trunks may be smooth, rough, or spiny.

Some palms have clusters of tall trunks; others are bushy or shrubby with very short stems. A few have a horizontal creeping stem, the leaves appearing to arise directly from the ground. The rattans, numbering over 400 species, are mainly vines that clamber over other jungle vegetation by means of hooklike spines. They are remarkable for the great length and uniform thickness of the slender trunks—as much as 550 feet and from $\frac{1}{8}$ to 3 inches in diameter.

The stem structure of palms is quite different from that of our familiar timber trees. Growth in diameter does not continue from year to year by the addition of new layers of cells, and there are no annual growth rings. In fact, the girth characteristic for a given individual or species is laid down in the early years of growth. There is but one main growing point—the terminal bud.

The bundles of water- and food-conducting cells, strengthened by heavy-walled fibers, are scattered in the midst of thin-walled cells that resemble pith. In a smoothly cut cross section, they appear as small dots or disks (fig. 2). In a longitudinal section, the "grain" is streaked and often very striking and handsome. The size, character, abundance, and position of the bundles determine the mechanical properties of the wood. Palms in which these are more concentrated toward the outer edge are notable for their very hard, dense "rind" or cylinder of wood, while the interior may be soft and pithy.



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Figure 2.—Cross section of a part of an oak trunk showing annual growth rings (left) and of a fossil palm showing scattered bundles (right).

The leaves of palm seedlings look more or less alike, and could easily be mistaken for grasses (fig. 3). The succeeding leaves eventually show the characteristic featherlike or fan shape. The longest palm leaves (*Raphia*) are featherlike and measure as much as 65 feet. The largest fan leaves are about 16 feet broad (*Corypha*) or long (*Mauritia*). When the leaves fall, distinctive scars are left on the trunk.

Palm flowers are small and lilylike in plan, but quite varied (fig. 4). They are often borne in such enormous numbers on much-branched flower stalks as to be very impressive. The flower stalks



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Figure 3.—Seedling palms. The mature leaves of date (left) are featherlike; of palmetto (right), fan shaped. At a still earlier stage with only one leaf, palm seedlings resemble grasses.

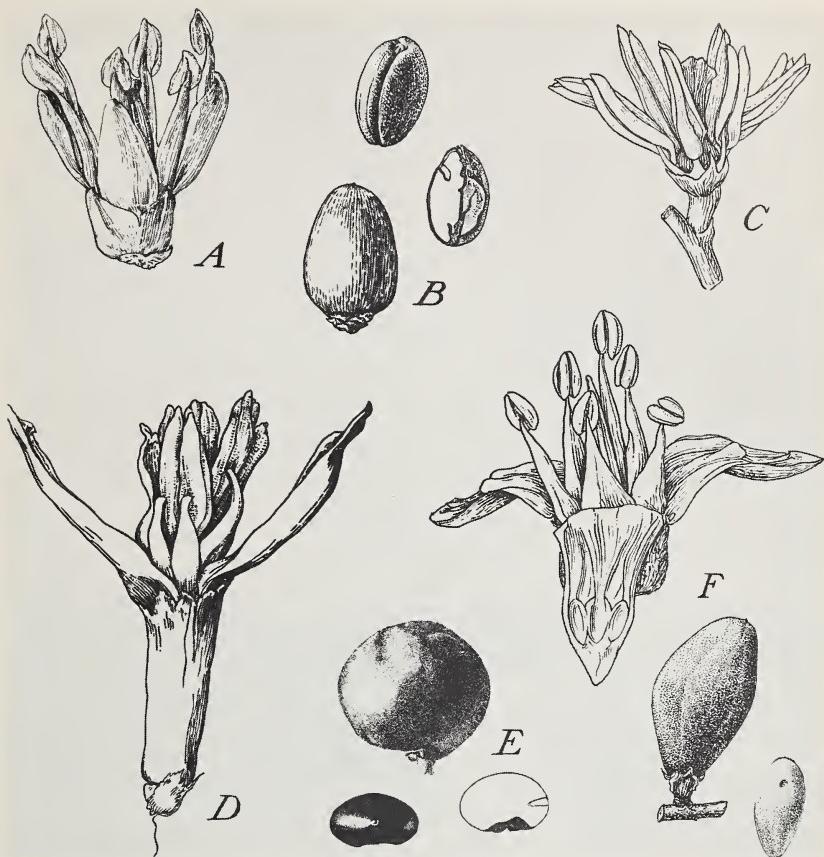


Figure 4.—Examples of palm flowers, fruits, and seeds. A, Flower of Louisiana palmetto; B, fruit and seed of Canary date; C, flower of Florida silverpalm; D, flower of California washingtonia; E, fruit and seed of Texas palmetto; F, flower, fruit, and seed of saw-palmetto. Flowers 9 X natural size; fruits about natural size.

develop within one or more protective leaflike, membranous or woody structures called spathes that eventually split or rupture to release them. The flowers of many palms are not perfect for setting fruits, but are either male or female. These may be borne on the same or separate flower stalks in the same tree or on separate trees.

The largest single fruits produced in the plant kingdom are those of the so-called double-coconut (*Lodoicea*) weighing 40 pounds or more. The smallest are about the size of a pea (*Euterpe*). Although the fruits of palms differ greatly in size and other characters, they are all somewhat like a peach or cherry in structure. The fleshy part may be pulpy or fibrous, sometimes oily, or almost

lacking; the pit layer may be a great deal thicker and hard and dense, as in the nut of a coconut or babassu, or thin and almost membranous, as in palmettos. A fruit usually holds one seed, sometimes more, with a small pluglike embryo (fig. 4, E). The kernels often contain appreciable amounts of oil.

WASHINGTONIA PALMS

California *washingtonia* or California-palm (*Washingtonia filifera*) is the only palm species native to the Western United States. It grows in rocky streambeds and near springs bordering the Colorado Desert of southeastern California and in Yuma County, Ariz., as well as in northern Lower California. Most of the groves or groups of these palms in California, numbering from two up to a thousand trees, are distinguished by special names, such as Twenty-nine Palms, Hidden Palms, and Twelve Apostles. Those in Palm Canyon near the base of the San Jacinto Mountains are perhaps the most famous and frequently visited (fig. 5). Not more than



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Figure 5.—California *washingtonia* in Palm Canyon, near Palm Springs, Calif.

100 individuals are known to be growing wild in Arizona, hidden away in a deep canyon of the Kofu Mountains. The genus was named in honor of our first President.

In keeping with the rigorous conditions under which it grows, California *washingtonia* is a sturdy palm with massive, cylindrical, grayish-brown, checker-bark trunk about 3 feet wide at the base and only slightly narrower above. It may become 60 or 75 feet tall. The fan-shaped leaves, more than 6 feet long, form a rather open crown; the leafstalks are usually longer than the leaf blades. The oblong central part of the blades is undivided, but the outer edge is cut into 60 or more somewhat drooping divisions that are margined by threadlike filaments. The specific name, *filifera*, means thread bearing, a characteristic that is more evident in young plants and immature leaves. Unless trimmed off or burned, the dead leaves hang on almost indefinitely, forming a shag that not only protects the growing point but also gives the palm more graceful proportions. When the leaves are removed—a common practice with cultivated palms—the remaining split leafstalk bases form an irregular crisscross pattern on the trunk. Clawlike teeth conspicuously margin the lower part of the leafstalks but become smaller or are entirely absent near the blade.

The erect young flower stalks look like long, branched green whips, the parts being at first completely wrapped up in the various spathes. The enveloping parts gradually unfurl, releasing the two (sometimes three or four) long pendent branches, each bearing showy clusters of small, white, vase-shaped, somewhat fragrant flowers (fig. 4, D). The mature flower stalks, averaging 12 feet in length, extend almost horizontally in the midst of the crown. They continue to persist long after fruiting, eventually hanging downward among the dead leaves. The fruits are ovoid black berries nearly a half inch long, with thin skin, sugary edible flesh, and a single grapelike seed. Indians used them, either fresh or dry, as food; even the seeds were ground up to make a kind of meal. Both salt and sugar may be derived from the trunk.

The only other species of this genus is the Mexican *washingtonia* (*Washingtonia robusta*), of Lower California and Sonora, Mexico. The specific name refers to its rapid or robust growth. It is taller (80 feet or more) and more slender than the California species, with an upwardly tapered, smoother trunk. The crown is smaller and more compact. The flower stalks are somewhat shorter with five to eight branches (fig. 6), and the fruits are slightly smaller and rounder. The clawlike teeth on the reddish-brown leafstalks are particularly conspicuous in young trees. Their reddish color

together with the persistent patch of woolly hairs at the base of the blade on the under surface readily distinguish even young plants of this species from the California *washingtonia*.

Both *washingtonias* are cultivated as ornamentals in many parts of the world (fig. 7). The Mexican species is most planted and is frequent, usually in double rows, on streets and avenues in California, in the Southwest, and in the Gulf Coast States from Texas to Florida and South Carolina (fig. 8).



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Figure 6.—Two unopened and one opening flower stalk (center) of Mexican *washingtonia*. The flower clusters gradually appear as the spathes and other enveloping parts unfurl from the main stalk and branches.



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Figure 7.—California *washingtonia* as an ornamental. Cultivated palms frequently have a different appearance from those in the wild.



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Figure 8.—Mexican *washingtonia* as an ornamental, lining a roadway in New Orleans.

PALMETTOS

Sabal, an unexplained native name, includes about 26 species of American palmettos. Palmetto means little palm. The cabbage palmetto (*S. palmetto*) is so called because of its edible bud or "cabbage," a feature shared with many other palms. Pickled or canned "heart of palm" of palmetto was sold some years ago, at least in the South, and that of "palmito" (*Euterpe*), an abundant Brazilian palm much esteemed for its edible bud, is currently available in some of our markets. Florida also has adopted cabbage palmetto as its State tree.

Also known as Carolina palmetto, cabbage palmetto is depicted on the State seal of South Carolina, the Palmetto State. The seal shows a palmetto standing erect on a seashore with an oak tree torn from the ground at its base, thus commemorating the defeat on June 28, 1776, of a British fleet at Charleston Harbor by the defending American forces in a rude fortification made of cabbage palmetto logs and sand.

The most widely distributed and abundant of our native tree palms, it often occurs in large groves or "palmetto prairies." The most extensive, about 150,000 acres, occupies Indian Prairie between the Peace River and Lake Okeechobee, Fla. From near Cape Fear, N.C., on islands and along the coast, it extends southward into Florida, where it occurs frequently except in the western portion beyond St. Andrew's Bay. It grows in a variety of habitats, preferring low-lying wet areas but also thriving in dry, sandy, or rocky places. Cabbage palmettos are adapted to ornamental planting and border avenues impressively in Savannah, Albany, Charleston, New Orleans, St. Augustine, and other southern cities. They grow well in the West but are much less frequent.

Cabbage palmetto may become 80 feet tall, although 50 feet is average, and 1 to 2 feet in diameter. The rounded crown, often dense and heavy, consists of large fan leaves, 5 to 8 feet long. Unlike washingtonias, the blades are partially folded upwards along the strongly curved midrib. The outer two-thirds of the blade is cut into many long, tapering, deeply split segments that stand out in various directions, some drooping. A strong, brown or black, threadlike fiber dangles in the clefts of the divisions. The leafstalks, without spines or teeth, are usually longer than the blades. Their bases, often called boots, split upwards in the middle and may remain attached to the trunk for a considerable period, giving a lattice effect, or soon slough off. The grayish-brown bark varies from almost smooth, though marked by thick fibrous leafscar lines, to distinctly ridged.

The large, branched flowering stalks bear two dozen or more beautiful clusters of small, white, perfect flowers from beneath close-fitting tubular spathes and other protective structures of the main stalk. They appear in the midst of the leaves and often extend rather stiffly beyond them in older trees. The flowers have a sweet odor and are much visited by bees and wasps. The nearly spherical shining black berrylike fruits, one-third to nearly one-half inch high, contain a single somewhat flattened shining brown seed enclosed in a thin membrane. They are borne in quantity, and the large clusters often hang downward in trees that have been closely trimmed (fig. 9).

This useful species is numbered among our native fiber-producing plants. Making palmetto brushes was a minor industry in Florida before 1897. In 1947 at least four mills in Florida were engaged in cleaning and processing the fibers from the young leafstalk bases. One-half million to 1 million pounds are prepared annually. The brushes are unaffected by hot water and caustics and are especially

employed in breweries, creameries, and citrus factories. To obtain the fiber the bud is removed, thus killing the tree, but this practice is not considered a serious threat to the native palm stands. Only young trees 6 to 8 years old are harvested every 3 to 5 years;

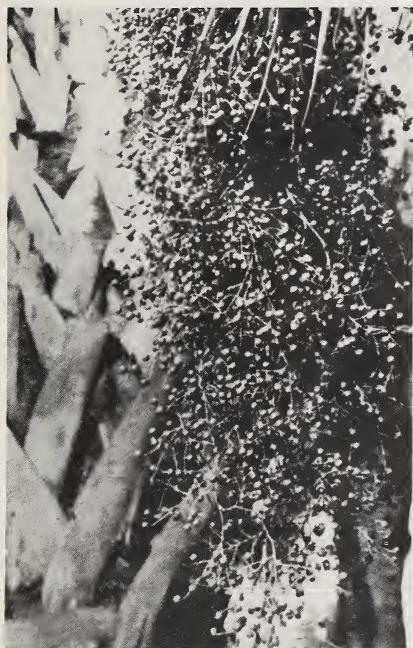
consequently, the forests are thinned and room is made for the growth of more young palms.

Whiskbrooms of palmetto fiber are sold in many stores. The shredded leaves may be made into brooms or paper or substitute for hair in plastering. The removal of raffialike strips from the leaf surface has recently developed into a small local enterprise. The strips may be dyed and woven into various fancy articles, such as table mats, bags, and baskets. Whole leaves are employed for thatching roofs. Unopened young leaves are gathered and sent to churches for use on Palm Sunday.

The trunks are sometimes used for piling and the construction of temporary wharves and docks. They are far more resistant than many other timbers to the shipworm borer. Efforts have been

made recently to promote use of palmetto wood, where easily available, for low-cost houses but the durability of such structures has not been tested.

The closely related Texas palmetto (*Sabal texana*) grows naturally on both the Texas and Mexican sides of the Lower Rio Grande. Its distribution is rather restricted in the United States; that in Mexico is not fully known. The most famous large grove is near Brownsville. Here, on the Rabb ranch, hundreds of palmettos grow in the midst of junglelike vegetation. The Texas palmetto has a larger, heavier crown and is stouter and shorter than the cabbage palmetto, attaining 50 feet or more in height and measuring 1½ to almost 3 feet in diameter. The fan-shaped leaves



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Figure 9.—Cabbage palmetto in fruit. The trunk shows the leafstalk bases or boots forming a lattice effect.

average 8 or 9 feet in width and several feet less in length; they are strongly curved, and the outer one-third of the blade is divided into about 100 segments that stand out more or less stiffly in various directions. The nearly spherical, dull black fruits (fig. 4, E) are rather large, $\frac{3}{4}$ inch wide or more, and frequently twinned. They contain a sweet, edible flesh. After ripening in October or November, they are harvested for local markets.

The leaves are much used for thatching various structures, including the homes of people with low incomes. The trunks make durable posts.

The Texas palmetto is a favorite ornamental tree in Texas. It is also planted along the Gulf coast and elsewhere, but mostly as specimen trees.

Victoria palmetto, described in 1913 as *Sabal exul* from a cultivated tree in Victoria, Tex., is no longer considered botanically distinct from Texas palmetto even though many of the plants reared from seed of the original palm appear to be more robust than the Texas palmetto, bear larger fruits, and are especially known for their hardiness (fig. 10).

ROYALPALMS

Royalpalms are among the handsomest of all palms. Their smooth, ringed, grayish, mostly cylindrical trunks, looking more like concrete pillars than living structures, are capped by a bright green supercolumn of sheathing leaf bases which terminates in a beautiful crown of darker green, long, featherlike leaves. They have been planted throughout the Tropics of both hemispheres, usually in double rows forming magnificent avenues.

This American group of a dozen species occurs naturally from western Venezuela and Trinidad throughout the West Indies to southern Florida, but only one species, *Roystonea elata*, is native to the United States. *Roystonea* honors General Roy Stone, an American engineer who rendered outstanding service to Puerto Rico at the time of the Spanish-American War. The specific name, *elata*, means tall.

Florida royalpalms, with stone-gray, faintly ringed trunks, become 90 to 100 feet tall and about 2 feet thick, or even more at the base (fig. 11). The sheath of only the outer, oldest leaf is visible in the 8- to 10-foot-long supercolumn since it completely encircles and encloses the others. The stiff leafstalk, 10 to 12 feet long, is flat at the base where it arises from the sheath, but it gradually narrows and becomes round above. The leaf blades, about the same length as the leafstalks, have a rather tousled ap-



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Figure 10.—Texas palmetto as a cultivated tree, showing heavy leaf crown and lattice of boots on the trunk.

pearance because the numerous leaflets, up to 3 feet long, are inserted in two rows on either side of the main midrib and thus stand out in various directions. The leaves curve over gracefully, the lowest ones often partly hiding the sheath column. As the outer leaf nears the end of its life, it droops and clings for a time, hanging upside down from the point of attachment. It eventually drops off clean, often with a crash, leaving a scar that completely encircles the trunk.



Figure 11.—Florida royalpalms provide an ornamental setting for a home in Fort Myers, Fla.

In spring a number of richly branched, drooping flower stalks, 2 to 3 feet long, appear at the base of the supercolumn, each having emerged from a long, pointed main spathe, which splits to release them. Both male and female flowers, white and fragrant, are borne in each cluster. The violet-blue fruits mature in the summer. They are almost round and somewhat less than one-half inch long.

The smooth skin encloses a narrow layer of fibrous, somewhat oily flesh surrounding an oval or nearly spherical pale brown seed.

Florida royalpalm formerly grew naturally about 250 miles farther north in Florida than it does today, and was far more abundant. It now occurs only in the three southernmost counties of Florida, mainly on low land and near tidal water. Those growing in certain hammocks of the Everglades are probably the most famous. In the past so many of these trees were removed for transplanting as ornamentals, or were destroyed by fire and other means, that they were in danger of complete extermination. The establishment of the Everglades National Park, which includes the former Royal Palm State Park, has now given hope for the protection of the remaining native royalpalms and the survival of the seedlings in that area.

Our native royalpalm is similar to that of Cuba, *Roystonea regia*, and has at times not been recognized as distinct, even though the late Dr. O. F. Cook of the Department of Agriculture described it as a new species, *R. floridana*, in 1901. The Cuban tree is stouter and not so tall; the flowering stalks are shorter, stiffer, and less richly branched; the fruits are not round and smaller; and there are differences in the seedling leaves and young trunks. Dr. Cook's view has now been accepted by other palm students, but the specific name he proposed has been replaced by the much older name, *elata*, given by William Bartram in 1791 to royalpalms he discovered near the present site of De Land, Fla.

The Cuban species is common on hills, in valleys, and in fields and is also much used as an ornamental to line avenues and roadways. It plays an important role in the island's native economy. The trunks, with their very hard outer rind of wood, serve for house and fence posts and to make various utensils. The leaf-sheaths were formerly used more than at present for wrapping and shipping tobacco; they are still employed for the siding of native houses, for sandals, and raincoats. The fruiting stalks make rough brooms and the oily, lopsided fruits are food for pigs and other domestic animals.

Our royalpalm, which was becoming scarce as a native species, is understandably prized mainly for its beauty. The Cuban, Carib (*Roystonea oleracea*), and Puerto Rican (*R. borinquena*) royalpalms are also much planted in Florida and in other semitropical and tropical areas.

COCONUTPALM

Probably no tree of tropical shores is so well known and commonly distributed as the coconutpalm. Like the date, it has been cultivated for so many centuries that its native home is not known. It probably originated somewhere in the Indo-Malayan region, where it exists in many natural forms. The coconut-growing belt extends 20° to 25° on either side of the Equator. Coconuts grow best on low-lying areas near the coast where there is circulating ground water and the annual rainfall is 40 to 60 inches or more, fairly evenly distributed throughout the year. The coconutpalm also grows successfully inland, even in elevated areas, if the conditions are favorable.

Copra is the dried kernel or "meat" of the nut from which the oil is derived. World production of coconut oil averages more than 2 million tons annually, of which about half moves in international trade. The United States imports annually about 190 million pounds of coconut oil and more than 650 million pounds of copra. The Philippines and Indonesia lead the world in the production of copra.

In our modern world, coconut oil is chiefly used in the manufacture of soaps, including shampoos, and detergents. Probably next in importance is its use as an edible oil by the baking and candy industries. Although we now depend almost entirely upon domestic vegetable oils for margarines and vegetable shortenings, coconut oil is still an ingredient of similar food products in some other countries. This oil is essential in the manufacture of synthetic rubber, hydraulic brake fluid for airplanes, and plasticizers used in making safety glass. It has many other highly specialized applications. Per pound, coconut oil yields 40 percent more glycerine, a strategic substance in both peace and wartime, than any domestic fat. Copra meal is a livestock feed and may be used as fertilizer. Shredded coconut is a familiar item in cakes, candies, and other desserts. The fiber of the husk, known as coir, is manufactured into rugs and other articles of commerce.

Perhaps a million acres of coconutpalms are growing in this hemisphere, but there are few scientifically managed plantations and the fruit yield is low. A considerable number of coconutpalms grow in southern Florida, from Palm Beach southward. Although some of them appear to be native, the coconut was introduced there long ago, perhaps from the West Indies. The fresh nuts are consumed locally.

Coconutpalms grow to be 100 feet tall, sometimes taller. The characteristic swollen base of the relatively slender, leaning, ringed

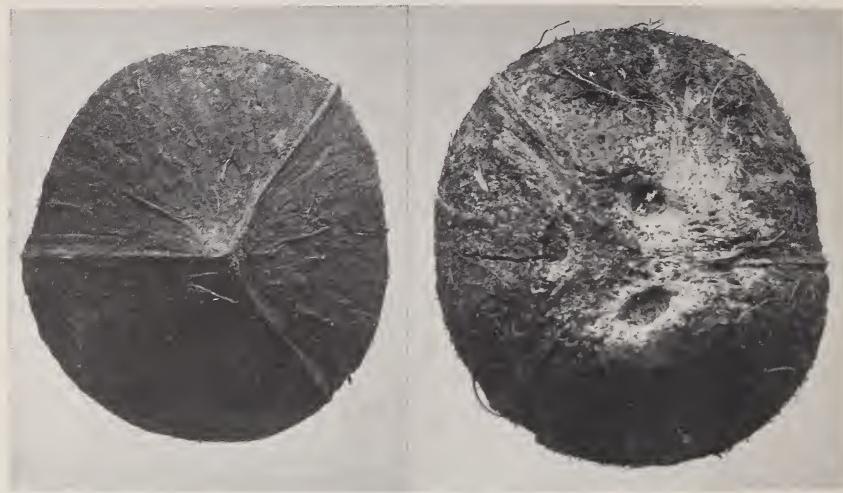
trunk and the graceful crown of the 15- to 20-foot long, beautifully curved, featherlike leaves are probably familiar to everyone from photographs or moving pictures, if not from direct observation.

The trees annually put forth about a dozen new leaves and an equal number of flower stalks. At first protected by a large woody main spathe, the flower stalks appear at the base of the older leaves. Each bears both male and female flowers, the latter in the lower part of the branches. The trees bloom more or less continuously and begin to fruit when about 5 years old. The fruits require a year to ripen (fig. 12). Some trees are naturally heavy bearers, yielding 100 or more fruits annually; others average 60 or less. The outer husk is usually removed from the fresh coconut fruits shipped to our markets, but some of the fibers still cling to the nuts (fig. 13). The single large seed contains firm white meat and some liquid in the hollow center. As a refreshing beverage, coconut "milk" is taken from coconuts that are full size but still green.



Figure 12.—Coconutpalms in a plantation bearing fruits.

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Figure 13.—Two views of a coconut from which the fibrous outer husk has been removed. Top or upper, pointed end (left); basal, rounder end (right) showing the three "eyes" through one of which the young plant will push forth in germination. Much reduced.

This palm has hundreds of native names, but *coco*, perhaps a modification of *coker*, of unknown meaning, is the one that has commonly been applied to it for some centuries in European literature. A similar Spanish-Portuguese word means an ugly mask or grimace, and it has long been supposed that the grinning monkeylike face suggested by the three "eyes" (germpores) at the base of the nut explained the name. However, this is probably just a coincidence. The scientific name is *Cocos nucifera*. *Cocos* refers to the fruit; *nucifera* means nut-bearing.

The palm itself, its cultivation and fruit production, and the preparation of copra and coconut oil have been the subject of exhaustive investigations, as is evident from the many published books and papers. Much research still needs to be done, especially in scientific plantation management in this hemisphere.

DATEPALMS

The original home of the datepalm (*Phoenix dactylifera*), one of the oldest of cultivated plants, is not definitely known. It probably once grew wild along ravines bordering deserts in the lower Tigris-Euphrates valley or in Arabia. Records of its cultivation in Mesopotamia, now Iraq, go as far back as 3000 B.C., and it may well have originated in that country. Its cultivation in Egypt apparently began at a later time.

Dates have long been, as they are today, one of the principal food crops from western Iran to Arabia and North Africa, where they are eaten by both man and beast. Large quantities are exported from the Old World; the United States alone having received about 40 million pounds annually for some years since the Second World War. In many places, the trunks and leafstalks furnish the only available fuel, the leaves serve for thatch, mats, baskets, and other articles, and the hard fruit stone has been ground up to feed camels. Wine may be derived from the trunk.

Spanish missionaries first brought the datepalm to our shores. Some of these original trees, or their offshoots, still exist. This palm is easily grown from seed and has now become naturalized in our warmer areas, including many places where the humidity is too high for satisfactory fruit production. Although fruit-yielding trees are not uncommon along the gulf coast, in Florida, and elsewhere, the arid regions of southern California and Arizona are best adapted to commercial production (fig. 14). Choice varieties were first successfully introduced from the Old World, beginning in 1900, by plant explorers of the Department of Agriculture. Experiments to improve methods of date culture have



Figure 14.—Date garden in the Coachella Valley, Calif.

continued ever since. In 1961 more than 4,000 acres were in commercial production in California and about 350 acres in Arizona. The production in California for 1960 was reported as 45,400,000 pounds valued at \$2.7 million.

Date trees attain 100 feet in height and an age of 100 to 200 years. The usually stiff, semierect, grayish- or bluish-green featherlike leaves, from 10 to 20 feet long, have upwardly folded, pointed leaflets and a rather long leafstalk, armed with groups of sharp spines, which are reduced and modified leaflets. Several hundred named varieties exist, differing particularly in the size, color, shape, and quality of the fruits. Propagation by the suckers or offshoots that develop at the base of the trunk in young datepalms is the only way to reproduce the parent tree exactly.

The trees are either male or female. If grown from seeds, the sexes are about equally divided. Since they differ little in general appearance, this is satisfactory for ornamental plantings. In commercial practice in the United States, however, it is customary to have only 1 male tree for about 50 female trees. The small flowers are borne on slender strands or branches of the flower stalks, which are at first enclosed in a single, rather rough-surfaced, stalked spathe (fig. 15). The male flowers are waxy, cream-colored, and crowded; they produce the pollen (fig. 16). The globular, whitish female flowers, which will develop into the fruits, occur in groups on the strands.

Datepalms were perhaps the first plants to be pollinated by artificial means. The practice of tying a few detached male strands inverted in the top of the female flower clusters to insure the setting of good fruit has been followed for several thousand years, and still is today. However, the pollen may be collected from the desired male clusters and dried or even stored for several months before using. It is then dusted directly on the female flowers or applied to cotton wadding, which is placed in the female cluster. Through many years of experimentation in the United States, new, precise methods have been developed to secure fine fruit quality and high yields.

The fruits ripen in about 6 months. They range from 1 to 3 inches in length and are classed as soft, semidry, or dry. Although perhaps 100 varieties are growing in this country, only a few are of commercial importance. The Deglet Noor, a semidry type from Algeria, far outranks the others. Depending on the variety and growth conditions, a single female tree produces from 100 to 300 pounds of fruit. It was through the careful selection, importation, and cultivation of offshoots of the best fruit-yielding trees that our thriving date orchards were established.

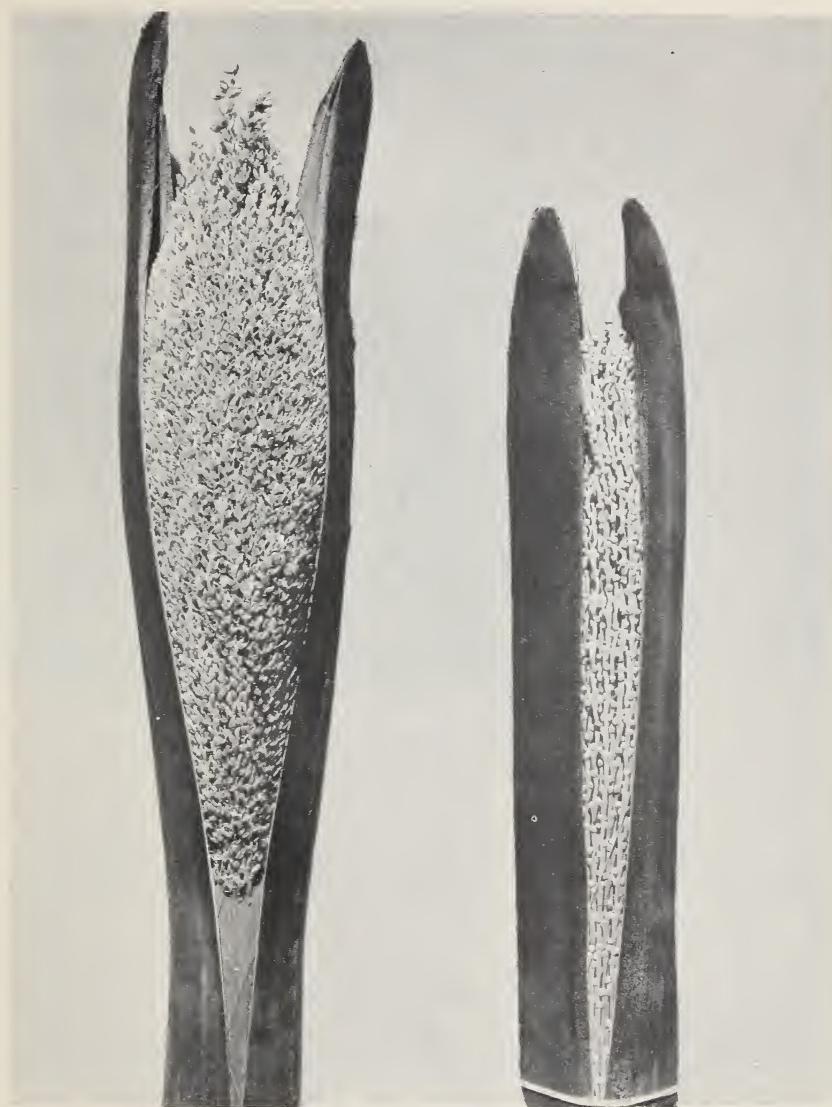


Figure 15.—Spathes of datepalm just opening to release the developing flower stalks. Male (left); female (right).

The name *Phoenix* means purple, but it may also refer to the ancient country of Phoenicia or the fabled Phoenix bird. *Dactylifera*, fingerbearing, alludes to the hanging fruits. The closely related graceful Canary Island datepalm (*Phoenix canariensis*), which bears inedible orange-yellow fruits, is usually pre-

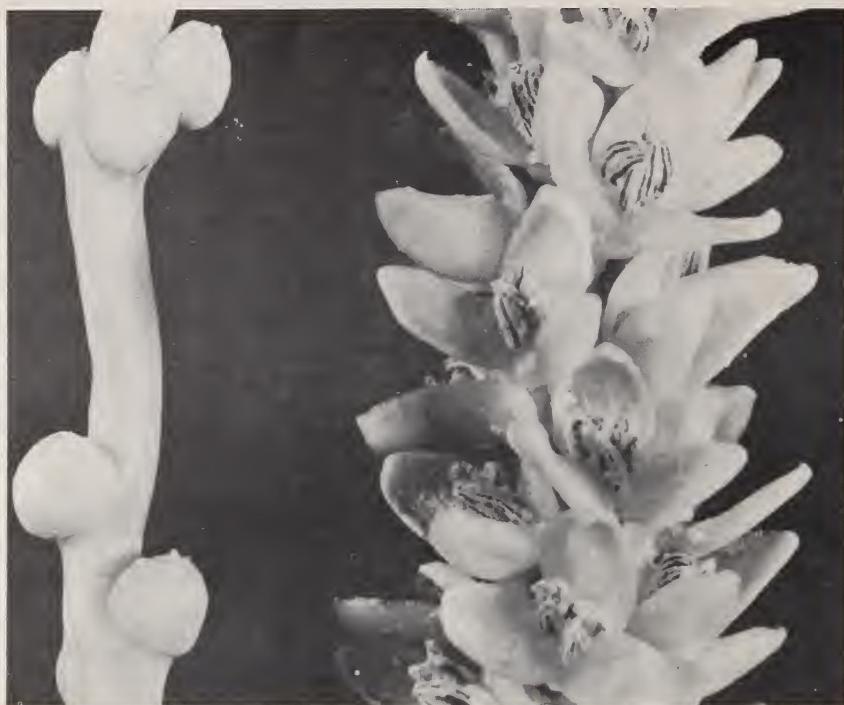


Figure 16.—Female flowers (left) and male flowers (right) of date on sections of strands that have been removed from the clusters.

ferred to the edible datepalm for ornamental purposes (fig. 17). Another datepalm of this genus, which includes a dozen species in all, is *P. sylvestris*, native to and extensively cultivated in India for the sugar in its sap.

FIVE FLORIDIAN TREE SPECIES

Five tree palms, none of which exceeds 35 feet in height, are restricted to the southern portion of Florida or occur on the Keys and also grow in various islands of the West Indies.

Brittle thatchpalm (*Thrinax microcarpa*) and Jamaica thatchpalm (*T. parviflora*) extend the length of the Keys, and the former also grows in the Cape Sable region of the mainland. They are pale trunked; the fan leaves, 2 to $3\frac{1}{2}$ feet wide, are lighter colored on the under surface; and the leafstalk bases are embedded in woolly webbing. The rather long flower stalks bear small flowers without true petals; these develop into whitish, berrylike, round fruits, less than one-fourth inch wide, with bitter, juicy, white



F-503853

Figure 17.—Young tree of ornamental Canary date in New Orleans.

flesh. Brittle thatchpalm is the stouter with trunk about 1 foot thick and 15 feet tall, or sometimes up to 30 feet. Jamaica thatchpalm has a slender trunk 10 to 30 feet high and 6 inches thick.

Florida silverpalm (*Coccothrinax argentata*) growing in southern Florida along the eastern coast and in all the Keys, may be a slender tree 10 to 25 feet tall and 6 inches in diameter or short-trunked, sometimes shrubby. It may be distinguished from the thatchpalms by the decidedly silvery lower surface of the small, 2-foot-wide fan leaves and the black or purplish, nearly globular, somewhat larger fruits with black-colored flesh. The small flowers, borne on short flower stalks, have a toothed, cuplike base and lack true petals (fig. 4, C).

Paurotis wrightii, in a genus of few species, grows in the Everglades but not on the Keys. It is unique among our palms in having several to many erect slender trunks, 35 feet or less tall, growing in a colony from an underground main stem. The fan blades, 2 to 3 feet wide, are carried on leafstalks margined with flat orange spines. Extending beyond the leaves, the slender flower stalks bear perfect flowers that ripen into red globular thin-fleshed fruits.

The feather-leaved Florida cherrypalm (*Pseudophoenix sargentii*) is better known in cultivation than as a wild tree. In the past many Florida cherrypalms were uprooted and sold, often as royalpalms, for ornamental purposes. This palm is now making a last stand on only four Keys but occurs with related species in the West Indies. The conspicuously ringed trunk, 35 feet or less tall, carries leaves 3½ to 7 feet long; the yellowish flowers ripen into cherrylike, orange-red, sometimes 2-lobed fruits, over one-half inch in diameter.

THREE FAN-LEAVED SPECIES THAT MAY BECOME TREES

The saw-palmetto (*Serenoa repens*) frequently but unprecisely called scrub palmetto, is the most abundant of our native palms. It occurs in many kinds of habitats, often forming dense growths, especially along sandy shores where few other plants thrive. It is almost a weed in the pinelands of Florida and neighboring States (fig. 18), ranging from South Carolina to the Keys and along the gulf coast to Louisiana. The leafstalks have saw-edged margins, easily distinguishing them from the sabals.



F-417738

Figure 18.—Saw-palmetto in midst of longleaf and slash pine woods near Waycross, Ga.

The horizontal stem, often incorrectly called a root, characteristically creeps just under or at the surface of the ground, bearing a tuft of leaves at the growing tip. Saw-palmetto is often shrubby, from a short erect trunk that sometimes branches, or, especially when protected from fire, may become a tree up to 25 feet tall.

The berrylike oblong fruits have long been used in medicine; the stems are a source of tannin and the flowers, of honey (fig. 4, F). The leaves are browsed by livestock, especially in winter. The very abundance of this palm has long constituted a challenge to make profitable use of the leaves and trunks. Leaves have been manufactured into paper of poor quality. The trunks, however, made a substantial contribution in the recent war. Their soft tissue was processed to serve as cork substitute for floats and gun plugs. It is now mainly manufactured into wallboards.

The conducting bundles, distributed throughout the stem, represent a potential native source of fibers for ropes, upholstery stuffing, outdoor rugs, and other durable articles. In the future, their commercial use may become profitable.

Etonia palmetto (*Sabal etonia*), often also called scrub palmetto, ordinarily has a corkscrew- or S-shaped subterranean stem bent upon itself in peculiar fashion. A single colony with leaning or erect trunks up to 8 feet tall has recently been discovered within the Ocala National Forest in Marion County, Fla. This palmetto grows mainly in the sandy areas of Florida's lake region.

The underground stem of Louisiana palmetto (*Sabal louisiana*), which mostly slants upward, very frequently emerges above ground into an erect trunk. It may be short, with crowded leaves, or become a small tree (fig. 19). Hundreds of these palms in southern Louisiana have trunks 3 to 6 feet tall and those of very old trees occasionally attain 10 feet. The tallest recorded—from Brazoria County, Tex.—is 18 feet high. This palmetto is also browsed by livestock and is often a weed in cottonfields. Its white flowers (fig. 4, A) are faintly fragrant.

OUTDOOR PALM COLLECTIONS

Some excellent outdoor palm collections or gardens are maintained in our country, particularly in Florida, Louisiana and other Gulf Coast States, and in California, where one may become acquainted with many species from various parts of the world. Many of these were first introduced and distributed here by the Department of Agriculture. Some few cool-climate palms have been reared successfully in the open as far north as Seattle, Wash.,



Figure 19.—Louisiana palmetto in a natural stand.

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and the interior of North Carolina. In such northerly latitudes they mostly require protection in severe weather and grow more slowly than is normal in warmer places. Some few palms are even growing outdoors in Virginia and the District of Columbia, but they make slow progress and are hardly typical of the species when growing under more favorable conditions.

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NAMES OF NATIVE AND NATURALIZED PALMS IN THE UNITED STATES

| | <i>Specific name</i> | <i>Synonyms or previous references</i> | <i>Common name</i> |
|--|---|--|--|
| Native: | | | |
| <i>Coccothrinax argentea</i> (Jacq.) Bailey | <i>C. argentea</i> auth., <i>not</i> (Lodd.) Sarg.; <i>C. garberi</i> ; <i>C. jucunda</i> ; <i>Thrinax garberi</i> . | | Florida silverpalm. |
| <i>Paurotis wrightii</i> (Griseb. & Wendl.) Britton | <i>Acoelorrhaphis arborescens</i> ; <i>A. Wrightii</i> ; <i>Acanthosabal caespitosa</i> ; <i>Serenoa arborescens</i> . | | Paurotis; saw paurotis; saw-cabbagepalm. |
| <i>Pseudophoenix sargentii</i> Wendl. | <i>Cyclostachys northropi</i> . Formerly referred to <i>P. vinifera</i> of Hispaniola. | | Florida cherrypalm; Sargent cherrypalm. |
| <i>Rhapidophyllum hystrix</i> (Pursh) Wendl. & Drude | <i>Chamaerops hystrix</i> . | Needlepalm. | |
| <i>Roystonea elata</i> (Bartr.) F. Harper | <i>R. floridana</i> . Formerly referred to Cuban royalpalm, <i>R. regia</i> . | | Florida royalpalm. |
| <i>Sabal etonia</i> Swingle | <i>S. deerlingiana</i> . | | Etonia palmetto; scrub palmetto. |
| <i>Sabal louisiana</i> (Darby) Bomhard | <i>S. adansonii</i> ; <i>S. glabra</i> . | | Louisiana palmetto. |
| <i>Sabal minor</i> (Jacq.) Pers. | <i>S. minor</i> . | | Dwarf palmetto; blue palmetto; scrub palmetto. |
| <i>Sabal palmetto</i> (Walt.) Lodd. | <i>Inodes palmetto</i> . Includes <i>S. jamesiana</i> , a juvenile form. | | Cabbage palmetto; Carolina palmetto. |
| <i>Sabal texana</i> (O. F. Cook) Becc. | <i>S. mexicana</i> S. Wats., <i>not</i> Mart.; <i>Inodes texana</i> . Includes the Victoria palmetto, <i>S. exulu</i> . | | Texas palmetto. |
| <i>Serenoa repens</i> (Bartr.) Small | <i>S. serrulata</i> . | | Saw-palmetto; scrub palmetto. |
| <i>Thrinax microcarpa</i> Sarg. | <i>T. keagensis</i> ; <i>Simpsonia microcarpa</i> . | | Brittle thatchpalm; brittle thatch. |
| <i>Thrinax parviflora</i> Swartz | <i>T. excelsa</i> Britton, <i>not</i> Griseb.; <i>T. floridana</i> ; <i>T. neilandiana</i> . | | Jamaica thatchpalm; silktop thatch. |
| <i>Washingtonia filifera</i> (Linden) Wendl. | <i>W. arizonica</i> ; <i>W. filamentosa</i> ; <i>Neowashingtonia filamentosa</i> . | | California washingtonia; California-palm; California fanpalm; desert palm. |
| Naturalized: | | | |
| <i>Cocos nucifera</i> L. | | | Coconut; coconutpalm. |
| <i>Phoenix dactylifera</i> L. | | | Date; datepalm. |